

The January 2013 and May 2014 North Aegean Earthquakes Sequence: Their Role in the Aegean Region

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Abstract

The North Aegean Sea is one of the most seismically active and deforming region between the Eurasia and Anatolia tectonic plates. This area is dominated by dextral strike-slip faulting and is characterized by frequent strong earthquakes.

On 8th January 2013 at 14:16 UTC a moderate earthquake ($M_w = 5.7$) occurred between the south of Gokceada and southwest of Bozcaada Islands. The earthquake was felt at a wide area. The area is defined as the continuation of the branch of North Anatolian Fault (NAF) inside the Aegean Sea. Fault plane solution determined by this study shows that the earthquake occurred on NE-SW oriented strike slip fault segment. The aftershocks distribution also supported the rupture of the NE-SW oriented fault.

Approximately 17 months later, another big earthquake occurred in the same area. On 24th May 2014, at 09:25 UTC, a powerful $M_l = 6.7$ ($M_w = 6.8$) earthquake hit Greece and Turkey, 87 km west of Canakkale, and totally 350 people injured in Greece and Turkey. The main-shock occurred on a fault with a NE-SW strike, where the largest portion of the energy was released towards these directions. Therefore the earthquake was felt strongly in Canakkale, Istanbul and Marmara region. In this study, we calculated CMT solutions for main-shock and important aftershocks ($M > 4.0$). CMT analyses were done for more than 50 important earthquakes. Moment tensor solutions show generally strike-slip faulting. The fault which caused earthquakes, is thought to be a branch of North Anatolian Fault Zone in the North Aegean Sea. Generally, the location of the earthquakes and orientation of the NE-SW nodal planes are consistent with right-lateral faulting within the North Aegean Trough (NAT). The Aegean Sea is characterized by dextral strike-slip faulting along NE-SW striking faults, along fault zones formed parallel to the North Aegean Trough (NAT). Strike slip faulting is changing to oblique, with significant component of extension, as one goes from the Aegean to the coastal area of NW and Western Turkey.

The sources region of the North Aegean earthquakes is influenced by both the Aegean extensional regime and the strike-slip regime in the western part of the North Anatolian Fault Zone.

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